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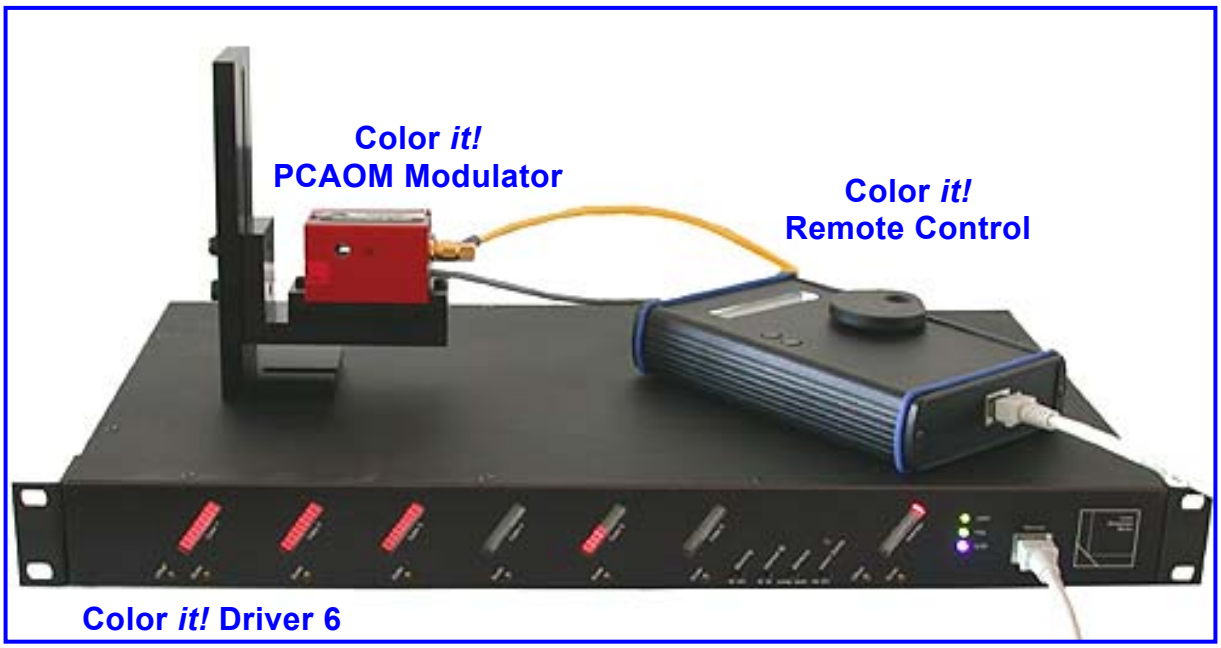
USER'S MANUAL

PCAOM Color *it!* - System 6



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Components

First of all you should count the devices you received to make sure that nothing was lost during shipping.

Pos.	Peace	Marking
1	1	Color *it!* Driver 6 for PCAOM
2	1	Color *it!* Modulator with mounting
3	1	Color *it!* Control Unit
4	1	HF-cable for modulator
5	1	Standard network cable with RJ-45 connectors for Control Unit
6	1	Power cable
7	1	User's Manual Color *it!*
8	1	Shutter with Sensor (optional)

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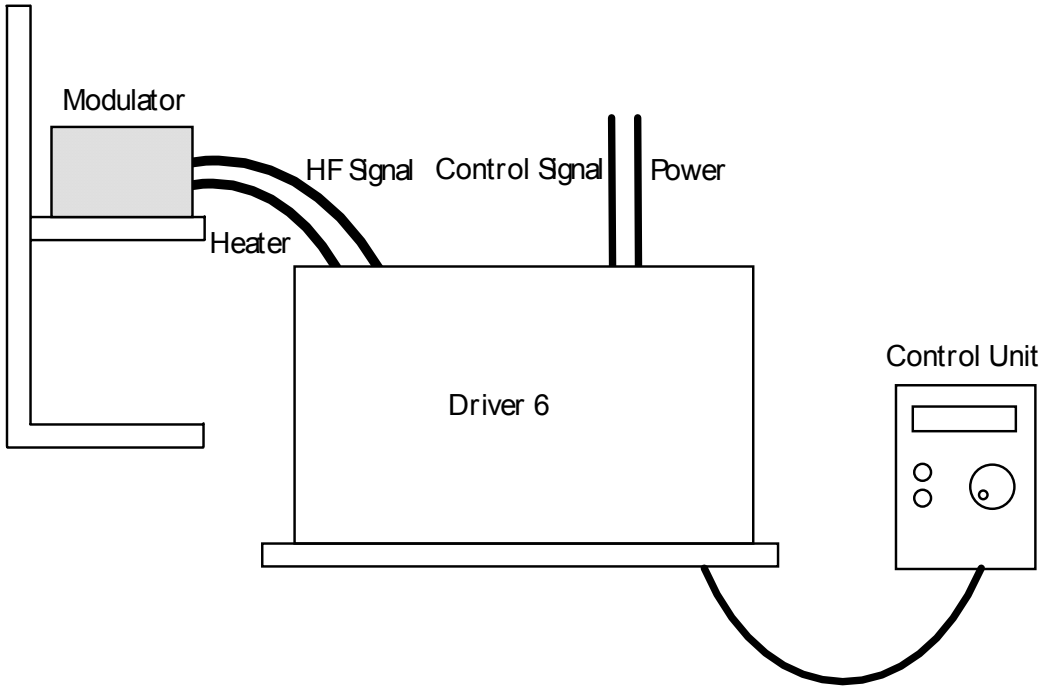
Getting Started

Your completely installed color system *Color it!* should look like this:



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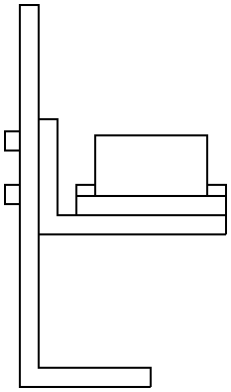
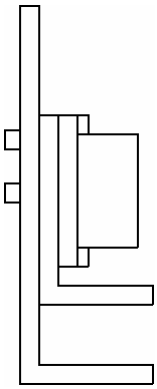
Modulator

First position the crystal in the beam.
For that purpose set the laser to the lowest visible level - class I.

The incoming beam has to be polarized vertically.
Should the incoming beam be polarized horizontally, the adjustable platform on which the crystal is mounted can be turned by 90° and reattached to the holder.



for vertical polarization



for horizontal polarization

The crystal rotates the level of polarization of the light by 90°.

The incoming beam should pass exactly through the center of the opening in the modulator marked ”IN”.
Adjust the modulator by tilting and rotating the swivel table so that the beam reflected by the crystal coincides exactly with the incoming beam.

Attention!
The efficiency of the modulator just like any other optical component depends on keeping the device clean. Make sure not to expose the modulator to a dirty environment (also for example artificial fog) since it is practically impossible to clean a badly soiled crystal.

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Color *it!* Driver 6

Attention!

The driver produces heat. Therefore active cooling by internal fans is necessary. This can only work properly when the air supply to the sides of the device is not obstructed and the temperature in the vicinity of the driver does not exceed 40°C.

You can connect the modulator to the driver now. For this you need two different cables, one for the HF signal for controlling the modulator **RF** and the other for the **Heater** to ensure a constant operating temperature of the modulator.

Important!
The crystal should be allowed to warm up for a short period of time (app. 10 minutes.) before adjustments are made. The LED in the bottom of the modulator housing indicates the heating process. When the nominal temperature value is reached the LED goes dark until it is necessary to heat again.

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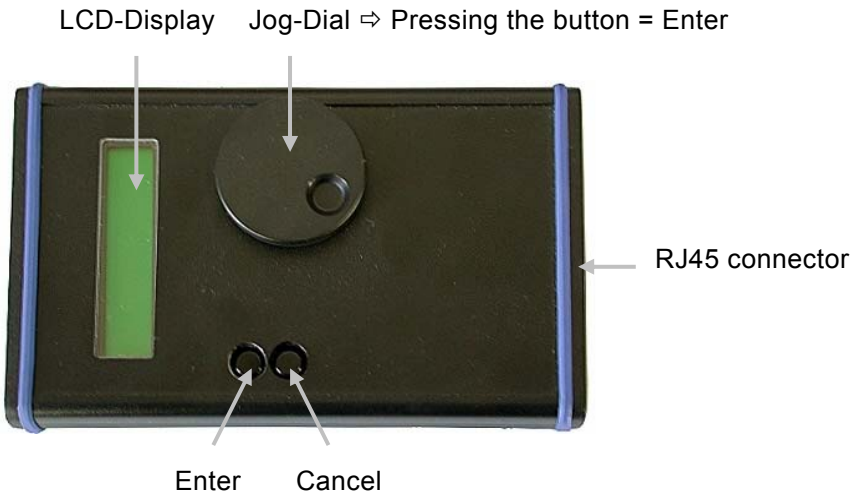
Control Unit

Now connect the control unit to the driver - **Remote** connector - using the included cable with RJ45 Western connectors.



Note:
In contrast to earlier versions of the Color *it!* driver the connecting cable is a non-crossed standard cable as used for normal network applications.

Power

Now your system is ready to be connected to the power line. The voltage can range from 100V to 240V AC. The LEDs (2 green LEDs and 1 blue LED) on the front of the driver for displaying the operating voltage should light up. You should hear the internal ventilators start up and the display on the control unit should display a message.

Attention!
If you use operating voltages of about 100 Volts and you turn off your driver note that you can only turn on the driver again after approx. 1 minute cooling.

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Adjustment

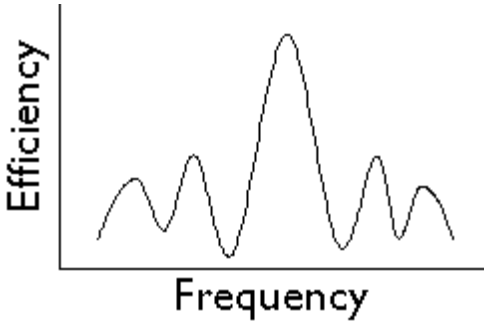
Please wait approx. 5 – 10 minutes until the modulator has reached its operating temperature. Check the adjustments of your Color *it!* driver by turning the jog-dial of the control unit until "TEST" appears in the display. Press the jog dial button or the "Enter" button. The Color *it!* driver sets all colors (channels) internally to the highest values now, i.e. the effective beam should have his maximum brightness while the brightness of the rest beam (waste) should be as low as possible.
In that case no further adjustment is necessary.
If you are not pleased with the result you have to carry out a manual or an automatic (optional) adjustment.

First switch the Color *it!* driver to the internal state, i.e. all control signals will be created internally, no external signal source has to be connected.
For this use the jog dial to select **SOURCE** from the main menu. Then press the jog dial button or the *ENTER* button. The cursor changes to the entry **EXT** in the upper right hand corner. Now you can change this to **INT** by using the jog dial again. Confirm this by pressing **ENTER** again. You will return to the main menu automatically. This is indicated by the cursor jumping back to the currently selected point of the main menu.

Now you can adjust channel by channel: for each channel two values have to be set: Frequency and Scale.
Select **CHANNEL** from the main menu with the jog dial and press *ENTER*. The cursor moves to the entry **ALL** in the lower right hand corner. Here you can select a specific channel by using the jog dial. When you are ready just press *ENTER* to confirm your selection.

Now you have to adjust the scale value to the minimum first. For this you have to select **SCALE** from the main menu and press *ENTER*. Then decrease the value displayed to the minimum of 36% and confirm with *ENTER* again.

Now you can adjust the **FREQUENCY** by selecting it from the main menu and pressing **ENTER**. The current value is displayed in MHz. Change this value by turning the jog dial. By changing the frequency you can determine the color which is assigned to the selected channel. Turn the jog dial until a beam of the desired color leaves the modulator exactly in line with the incoming beam. If you scan the frequency range of the desired color slowly you will realize that this color is displayed at three to five frequencies. Usually the middle frequency has the highest efficiency, compare diagram:



Adjust to the middle frequency to get the maximum efficiency!
After completing your settings confirm with *ENTER*.

Now you change to **SCALE** again and increase the value until you do not see any improvements in the efficiency. Do not set the Scale value too high because the efficiency can decrease again when the values get too high. Also the ability to control the color suffers when the Scale value is too high: Increasing the control signal only has an effect with low values, above a certain value the intensity (brightness) does not change or even decreases.

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If you are not satisfied with the result by now, just repeat the last two steps alternately. Approach the optimum of Frequency and Scale step by step.

To continue with another color on another channel just change to **CHANNEL** from the main menu and select the new channel to be adjusted.

When you have finished your adjustments, under **CHANNEL** again select **ALL** and under **SOURCE** switch back to **EXT** again.

Control Signals

Finally connect your control system to the Color *it!* driver. There are two inputs: one Lasergraph DSP "6-line" and one "ILDA-ISP In" for the standard ILDA connector. **Do not use both inputs simultaneously.**

That's All !

When you send control signals to the driver you can gauge by the bar graphs for each color/channel as well as for the Intensitiy/Blank signal if the signals reach the Color *it!* driver correctly.

If there is no beam although the control signals are present, please check the position of the switches Blanking (ON/OFF), Blanking (analog/digital), blanked@ (0V/5V) and extern Safety (ON/OFF) on the front panel.

In case of doubt please switch Blanking (ON/OFF) to OFF and extern safety (ON/OFF) to OFF.

If there still is no beam check with the control unit **TEST** whether the Color *it!* driver is adjusted correctly.

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During Operation

Pilot Lamps for Power Supply

The main power of the driver is supplied by a switching power supply with 24V output. The upper green LED on the right of the front panel indicates this power. The two LEDs below the green LED indicate the presence of the voltages derived from 24 V(+Vs and –5.5V).

Pilot Lamps for Color Channels and Intensity/Blank

A bar graph with ten segments is assigned to each channel/color input. It displays the actual state of the respective controlling signal. The Intensity/Blank signal has a separate bar graph.
The display stays dark if the signal is 0V, when the signal voltage is 5V (maximum) the uppermost segment lights up. Input signals between these two values are displayed by corresponding segments. A quickly changing signal possibly causes all segments to light up.

Switches for Intensity/Blanking Control

The switch **Blanking ON – OFF** is used to determine whether the Intensity/Blanking signal has an effect or not.
If there is no Intensity/Blanking signal connected the switch should be set to OFF.

The following switches are only effective if **Blanking is ON**:

The switch **Blanking analog – digital** determines whether the Intensity/Blanking signal will be interpreted as intensity (analog) or as blanking (digital).

- **Blanking analog**: The total brightness (intensity) of the laser beam follows the Intensity/Blanking signal proportionally: 0V = 0% and 5V = 100%.

- **Blanking digital**: The Intensity/Blank signal will be interpreted digitally, i.e. only the states ON and OFF are possible.
  With the switch in this position the switch **blanked@** is used to determine if the signal level 0V or 5V causes the beam to be blanked.
  - **blanked@ 0V**: A signal of +0V to +2.5V at the Intensity/Blanking signal input will shut off the laser beam. If the input signal is +2.5 to +5V the laser beam has a color corresponding to the inputs Color 1 to 6.
  - **blanked@ 5V**: A signal of +2.5V to +5V at the Intensity/Blanking signal input will shut off the laser beam. If the input signal is 0V to +2.5V the laser beam has a color corresponding to the inputs Color 1 to 6.

The following switch positions guarantee a reliable scan-fail safety function via the blank lines:
- Blanking (ON/OFF) set to **ON**,
- Blanking (analog/digital) set to **digital**
- blanked@ (0V/5V) set to **0V**

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Control Switch for External Safety

The switch **extern Safety On – OFF** is used to determine whether the external safety signal line has an effect or not.
This input can be used for connecting laser projectors (from other manufacturers) which do not implement a scan-fail safety function via the blank lines. The external safety signal line is insulated by optocoupler and surge protected.
If the switch position is ON a voltage of +5V must be applied at the external safety input to activate the driver. If the signal voltage is smaller than 1V the Color *it!* driver will be deactivated immediately and the laser beam will be interrupted.

Set the switch to OFF if no external safety signal is connected.

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Adjustment of Input Signals

This adjustment is usually done by the manufacturer, so it is normally not necessary for you to change it. However, sometimes special circumstances may occur, affecting your line between the controlling system and the Driver, so that the signals at the input may not meet the specifications anymore. For instance, offsets may occur which prevent the unit from shutting off the beam completely. Also, the resistance in the connecting cables may prevent the signals to reach the required levels. For this reason you can readjust the ”**Offset**” for all colors together and the ”**Scale**” for each channel separately. The adjustments are done by means of trim-pots on the front panel.

If you think or the bar graphs indicate that the input signal does not cover the full range, readjust the driver by following these steps:

Bring the color outputs of your control system down to 0V.
To do this on the Lasergraph DSP you just load the film "ColorsonFaders" stored in the directory ”C:\Tests” or program it in the [Edit] Mode:

- Entry 0
- Set Beam (default)
- SetCOlor (Analog 0 - 5 or 0.000 for 0V, 1.000 for 5V)
– BeamOn
- Goto 0

First adjust the zero point. Pull the faders 1 - 6 (on your DSP Faderboard) down (0V). The effective beam should not be visible. If not turn the trimmer ”Offset” (underneath the display for Color 1) until the beam is completely extinguished.

Attention!
If the control unit is available you can select one of the channels (1 to 6) via **CHANNEL** and select **VOLTAGE** to display the present level. It will be displayed as a percentage of full scale. You should adjust the Offset until you get 0,0% or slightly below.

Now you can adjust maximum values for each channel (color). You have to set the value for each color to maximum on your control computer. On the DSP you have to load the test film mentioned before and pull the faders 1 - 6 up (5V). Now the uppermost segment for each channel should be lit, if not turn the trimmer ”Scale” for the corresponding channel until the segment begins to light up.

Attention!
For this adjustment you can also use the control unit (select **CHANNEL** ⇨ **INPUT VOLTAGE**). The displayed value should be 100,0% or a little bit above.
The adjustment for the intensity signal is similar. First shut down the intensity signal. This is easily done on the Lasergraph DSP by stopping all picture outputs. Then adjust the correct zero point with the trimmer ”Offset” (below the display ”Intensity”) so that all segments remain dark. Afterward you have to set the Intensity signal to maximum. On the Lasergraph DSP start the film “ColorsonFaders” again (the position of the faders is irrelevant).
Adjust the ”Scale” for Intensity so that the uppermost segment lights up.

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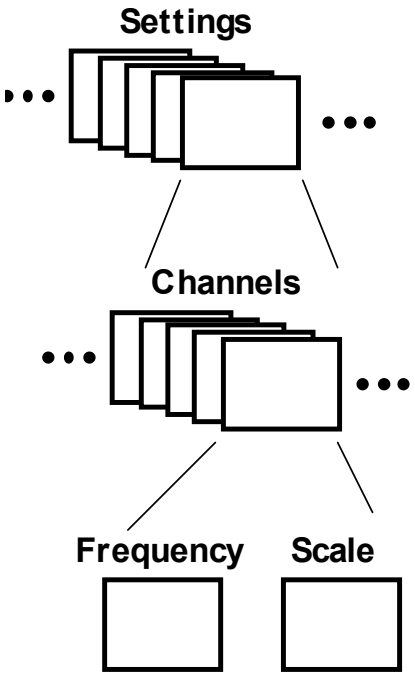
Settings Create Order

All information concerning one specific configuration of the Color *it!* is stored together in one setting. This configuration remains unchanged even when the driver is turned off. Therefore different settings may be used for different types of lasers.



You can chose between the different settings with the function **SETTING** from the main menu. The new setting will be sent to the hardware when you push the **ENTER** button to confirm your selection.

You can also edit a name for each setting. For this just select **EDIT NAME** from the main menu, press **ENTER**, then select the character position you want to edit with the jog-shuttle and press **ENTER**. Now you get a filled cursor and you can select your desired character with the jog-dial. Confirm this with **ENTER**. When you have finished you return to the main menu with **CANCEL**, the lower button on the Control Unit.

The device will start with the setting which was selected when the unit was turned off.

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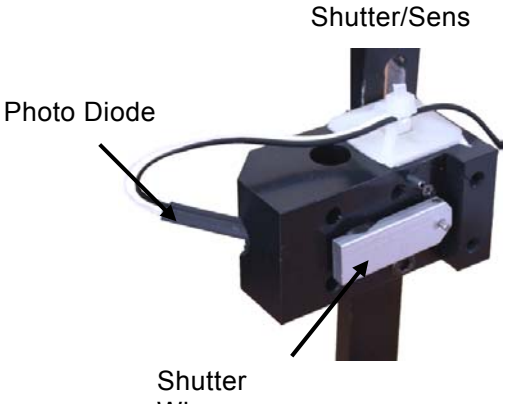
Measuring Tools

If no instrument for measuring output is available for making adjustments, it is also possible to use a grating. Differences in brightness can be discerned very well by the eye in the much weaker spectrums of higher order. In this case it may be of more use to watch out for optimum deletion of the waste beam rather than for maximum brightness of the diffracted beam.

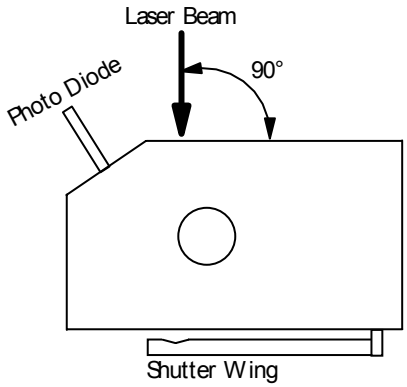
You can also work without any instruments because the jog-shuttle is a perfect tool for implementing your sense for the maximum efficiency even if you can't see any differences in brightness near the maximum. With a little practice the results will be nearly the same as if you are using a high precision instrument for measuring.

Auto Adjust

In combination with an optical Shutter/Sensor unit the Color*it!* driver is capable to calibrate itself. The Shutter/Sensor can be connected to the interface "Sensor In" on the Color *it!* driver's back.



Place the sensor in the beam so that the part reflected off the shutter wing hits the photo diode.



During the adjustment the shutter wing closes automatically and reopens afterward. Therefore the Shutter/Sensor can remain on the laser bench.

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If an Accurate Laserprojector with an internal Shutter/Sensor unit is connected to the ILDA output of the Color *it!* driver ”ILDA ISP Out” the auto adjustment is done via the Accurate.
Obviously the Accurate has to be connected via fiber to the effective beam from the Color *it!* modulator.
No Shutter/Sensor unit is necessary on the laser bench.
In both cases the signal appears as a measurable voltage on the connector ”ILDA ISP In” Pin 12 (Projector IN) of the Color *it!* driver measured against Pin 25 (ProjGNDIN).

If the shutter line of the connector ”ILDA ISP In” Pin 13 is short-circuited against Pin 25 (ProjGNDIN) the shutter of the Accurate will close and it is possible to measure the incoming laser power.

AUTO ADJUST (ALL):
First of all there is a security requester because there is no undo. If you confirm with yes the system begins to search for the standard colors on the standard channels so you will get a normal setting for operation. It is necessary that your laser emits the lines needed for this (red, green, blue, light-blue, deep-blue and yellow). If one or more colors are missing the corresponding channels will not be used. No “undo” is possible.

AUTO ADJUST (CH1...CH6):
The current color will be displayed. Now you can select another color using the jog-shuttle. The Color *it!* will adjust the frequency and scale automatically.
If you want to keep the new color press ”Enter” otherwise press ”Cancel”.

OPTIMIZE (ALL):
The Color *it!* optimizes all channels. The system analyzes which color was selected for the corresponding channel and then searches for the best possible adjustment for this wavelength. No ”undo” is possible.

OPTIMIZE (CH1...CH6):
The Color *it!* tries to find the best adjustment for the current color of the channel. The result is displayed and you can press ”Enter” to keep it, otherwise press ”Cancel”.

Attention!
To keep the time for the process short, only certain parts of the total frequency spectrum are scanned by the Color *it!* If the deviation from the expected frequencies is too high in your modulator, the automatic adjustment may not yield the best possible result. In that case you will have to do the adjustment manually using the functions ”Frequency” and ”Scale”.

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Switching Contacts for Color 7 and 8

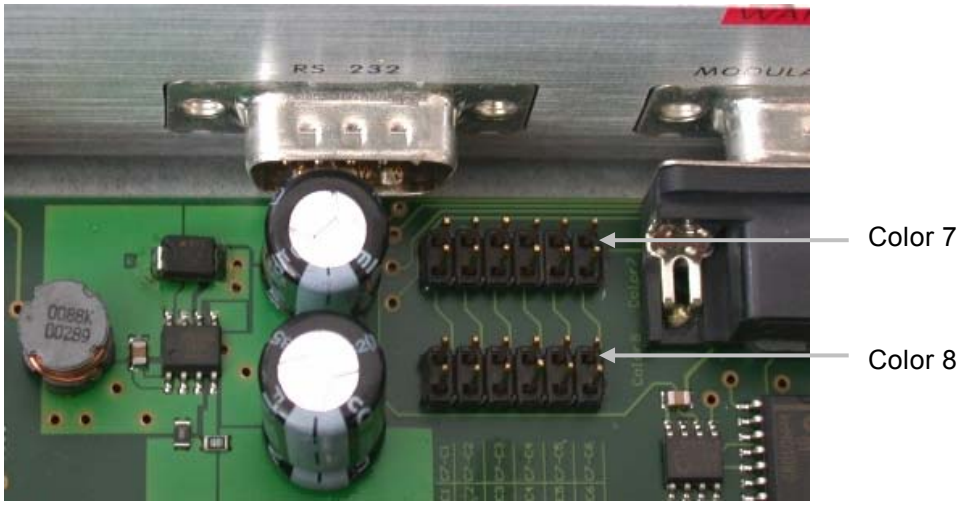
The Color *it!* driver can be equipped with an 8-channel driver module (option).

You can recognize the 8 channel version as follows:
After starting the driver the following message appears on the control unit:

```
Color it
   6.0              C 8
```

< number of channels

Because there are only 6 input signals available for controlling it is necessary to specify which input signals should control channel 7 and channel 8.
For this there are two sets of contacts inside the driver, compare picture:



Normally channel 7 is assigned to dark red (676nm corr. 85,1 MHz) and channel 8 to light green (431nm corr. 116,5 MHz). Therefore channel 7 will be controlled by color 1 (red) and channel 8 by color 2 (green).

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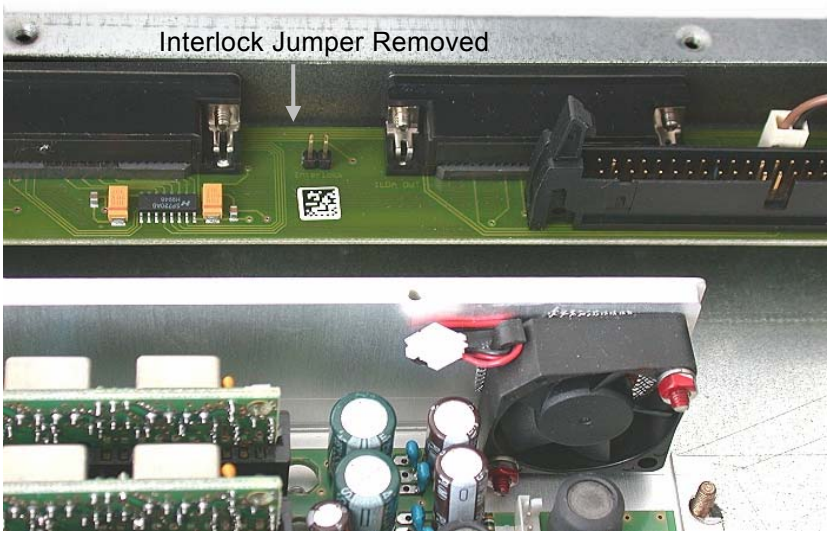
Interlock

The Color *it!* driver has all necessary connections to build the interlock loop according to the demands of the safety regulations.

The Interlock lines are located at the "ILDA ISP In" and the "ILDA ISP Out" connectors.

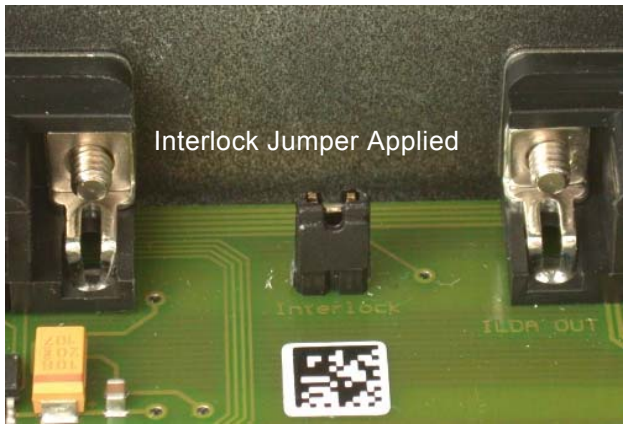
If an additional device (e.g. the Accurate Laserprojector) is to be included into the Interlock loop the jumper "Interlock" must not be in place, see picture:



Now Interlock A on "ILDA ISP In" connector is connected to Interlock A on "ILDA ISP Out" connector. The same is true for Interlock B.

```
Interlock A  ----------------------+--------------------Interlock A-----------------------Interlock A----
IN                                                     OUT                                  Accurate      |
Interlock B-------------------------+--------------------Interlock B-----------------------Interlock B-----
```

If only the Color *it!* driver is to be included into the Interlock loop the internal Interlock Jumper has to be applied. This jumper connects the lines Interlock A (Pin4) with Interlock B (Pin 17) and closes the loop.




```
Interlock A  ----------------------+--------------------Interlock A
IN                                 |                   OUT
Interlock B-------------------------+--------------------Interlock B
```

You can also connect Interlock A (Pin 4) with Interlock B (Pin 17) on the "ILDA ISP Out" connector.

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Scan-Fail Safety-System

Usually the scan-fail system is operated using the lines Intensity/Blank+ and Intensity/Blank- according to ILDA ISP Standard and using the lines blank and GND of the "Color In 6 line" input.
If the voltage difference between these lines is 0V the laser beam is turned off by the Color *it!* system regardless of the color inputs.
To turn the laser beam on a voltage of +5V has to be applied between these lines (Intensity/Blank+ and Intensity/Blank- or Blank and GND). Usually the control computer supplies this voltage.

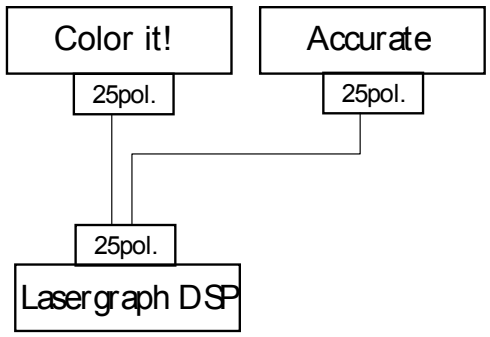
In case of a scan-fail, i.e. an unsafe operation (image to small, hot spots, scanner defect, projector is turned off) the Accurate or another device short-circuits the lines (Intensity/Blank+ against Intensity/Blank- or Blank against GND) and reduces the voltage level regardless of the previously applied value to 0V. The laser beam will be interrupted immediately.

However sometimes there are applications where it is not possible to realize the scan-fail operation via the blank lines. Besides an EMERGANCY-STOP (without any delay) may be needed. For this the Color *it!* driver is equipped with an optocoupler-insulated and surge-protected external Safety-Input. If it is active a voltage of app. +5V has to be applied so that the Color *it!* driver "opens" and supplies an effective beam.

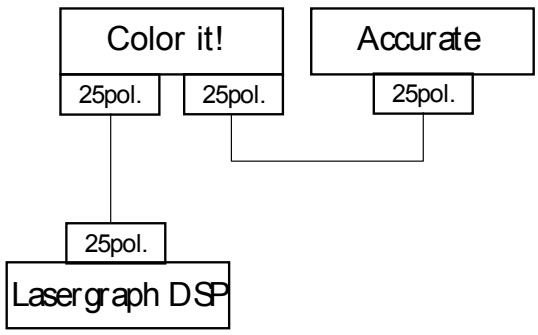
Lasergraph DSP *workstation* Connected To ILDA ISP In Input

The 25pol DSP output of the DSP cards at the **Lasergraph DSP *workstation*** does not follow the ILDA standard!!!
Therefore you need a "DSP to ILDA" Adapter version A or B with an ILDA conforming output for connection to your Lasergraph DSP. The further cable connections are described in the sketches:

Version A



Version B



On the Color *it!* driver:
- Blanking ON/OFF set to **ON**,
- Blanking analog/digital set to **digital**
- blanked@ (0V/5V) set to **0V**

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Lasergraph DSP *compact* Connected To ILDA ISP In Input

The scan-fail system is operated via the lines Intensity/Blank+ and Intensity/Blank-.

Just connect the ILDA ISP connector of your **Lasergraph DSP *compact*** with the ILDA ISP In connector of the Color *it!* driver and connect the **Accurate l**aserprojector to the ILDA ISP Out connector of the Color *it!* driver.

On the Color *it!* driver:
- Blanking ON/OFF set to **ON**,
- Blanking analog/digital set to **digital**
- blanked@ (0V/5V) set to **0V**

Lasergraph DSP *workstation* Connected To Color 6 line In Input

a) You are using a **new splitting connector** on the Lasergraph DSP.
DSP to Scanner/6-lines with blank inversion:
You have to set the adapter switch "Beam Off" to 0V.
I.e. blank signal = 0V: beam off and blank signal = 5 V: beam on

On the Color *it!* driver:
- Blanking ON/OFF set to **ON**
- Blanking analog/digital set to **digital**
- blanked@ (0V/5V) set to **0V**

The scan-fail system is operated via the blank lines.

b) You have an old splitting connector without blank inversion at the Lasergraph DSP.
This adapter still follows the old blank logic:
blank signal = 5 V: beam off and blank signal = 0 V: beam on.

On the Color *it!* driver:
- Blanking ON/OFF set to **ON**
- Blanking analog/digital set to **digital**
- blanked@ (0V/5V) set to **5V**

With this adapter it is not allowed to connect the blank lines of the scanner connector to the Accurate Laserprojector (compare Accurate manual). Therefore scan-fail system operation is not possible via the blank lines!

However, you can use the external safety input.

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Lasergraph DSP *compact* Connected To Color 6 line In Input

The scan-fail system is operated via the lines Blank and GND.
The blank signal follows the logic:
Blank signal = 0V: Beam off and blank signal = 5V: Beam on

Just connect the **Lasergraph DSP *compact*** "Color 6-line" to the "Color 6-line In" of the Color *it!* driver. Connect the Accurate Laserprojector to the "Scanner RGB" connector of **the Lasergraph DSP *compact***.
On the Color *it!* driver:

- Blanking ON/OFF set to **ON**,
- Blanking analog/digital set to **digital**
- blanked@ (0V/5V) set to **0V**

Other Controllers Connected To ILDA ISP In Input

The scan-fail system is operated via the lines Intensity/Blank+ and Intensity/Blank- which should be supplied by the controller.
In case of a scan-fail, i.e. an unsafe operation (image to small, hot spots, scanner defect, projector is turned off) the Accurate or another device short-circuits the lines Intensity/Blank+ against Intensity/Blank- and reduces the voltage level to 0V regardless of the previously applied value. The laser beam will be interrupted immediately.

Just connect the Accurate or another laserprojector to the ILDA ISP Out connector of your Color *it*! driver.

On the Color *it!* driver:

- Blanking ON/OFF set to **ON**,
- Blanking analog/digital set to **digital**
- blanked@ (0V/5V) set to **0V**

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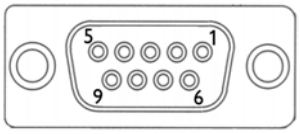
Technical Data

PIN Assignment of the Lasergraph DSP 6-line connector

9pol-Dsub-female



Pin	Signal	Color *it!*	Level Unipolar	DSP
1	red	Channel1	0...+5V	red
2	blue	Channel3	0...+5V	blue
3	deep blue	Channel5	0...+5V	deep blue
4	blank	Blank	0V / +5V	blank
5	n. c.	n. c.	0V / +5V	logoshutter
6	green	Channel2	0...+5V	green
7	light blue	Channel4	0...+5V	light blue
8	yellow	Channel6	0...+5V	yellow
9	GND	GND	GND	GND

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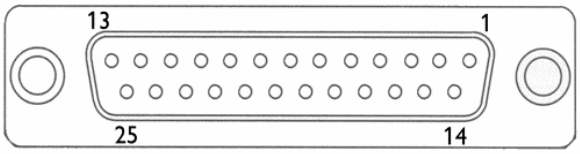
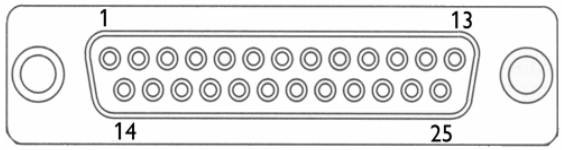
PIN Assignment of the ILDA connectors



ILDA IN 25pol Dsub-male



ILDA OUT 25pol Dsub-female

Pin	Meaning	Color *it!*	Level	ILDA ISP IN	ILDA ISP OUT
1	n.c.	looped		X+	X+
2	n.c.	looped		Y+	Y+
3	blanking	Intensity/Blank +	0 - + 5V (0 / +5V) in reference to Intensity/Blank -	Intensity + Blank +	Intensity + Blank +
4	Interlock	Interlock A		Interlock A	Interlock A
5	red	Color1 +	0 - + 5V in reference to Color1 -	R+	R+
6	green	Color2 +	0 - + 5V in reference to Color2 -	G+	G+
7	blue	Color3 +	0 - + 5V in reference to Color3 -	B+	B+
8	deep blue	Color5 +	0 - + 5V in reference to Color5 -	User 1+	User 1+
9	yellow	Color6+	0 - + 5V in reference to Color6 -	User 2+	User 2+
10	light blue	Color4+	0 - + 5V in reference to Color4 -	User 3+	User 3+
11	n.c.	looped		3D L/R+	3D L/R+
12	power measurement	to control system	0 - + 5V in reference to GND IN	projector IN	
12		from laserprojector	0 - + 5V in reference to GND OUT		projector OUT
13	Shutter	from control system	0 / +5V in reference to GND IN	shutter IN	
13		from laserprojektor	0 / +5V in reference to GND OUT		shutter OUT
14	n.c.	looped		X-	X-
15	n.c.	looped		Y-	Y-
16	reference for Intensity/Blank +	Intensity/Blank -		Intensity/Blank -	Intensity/Blank -
17	Interlock	Interlock B		Interlock B	Interlock B
18	reference for red	Color1-		R-	R-
19	reference for green	Color2-		G-	G-
20	reference for blue	Color3-		B-	B-
21	reference for deep blue	Color5-		User 1-	User 1-
22	reference for yellow	Color6-		User 2-	User 2-
23	reference for light blue	Color4-		User 3-	User 3-
24	n.c.	looped		3D L/R-	3D L/R-
25	reference for power measurement and shutter		GND	GND IN	
25			GND		GND OUT

Interlock A+B can be connected inside the Color *it!* using a jumper.
n.c.: not connected

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Frequencies

The frequencies in the following table are only approximations because the values may differ for specific modulators and shift with the temperature and position of the modulator.

Color	λ	Frequency
deep red	676 nm	85,1 MHz
red	646 nm	89,7 MHz
yellow	568 nm	105,3 MHz
very light green	531 nm	116,5 MHz
light green	521 nm	118,2 MHz
green	514 nm	120,2 MHz
turquoise	496 nm	127,0 MHz
light blue	488 nm	129,5 MHz
blue	476 nm	134,0 MHz
deep blue	457 nm	142,2 MHz

Dimensions

- Color *it!* driver 6
  484 mm x 259 mm x 44 mm (l x w x h)
  Weight: app. 4,45 kg

- Control Unit
  112mm x 168mm x 31mm (l x w x h)

Power Supply

100V/240V AC
50Hz - 60Hz
app. 36W power consumption
IEC 320 plug

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Laser Safety

Working with laser systems makes it necessary to follow certain safety procedures.
For safe operation of your laser system you always absolutely have to follow the **manual** for the laser you are using.
There are four groups of dangers when working with lasers:

1. Danger to the Eye

The most light-sensitive organ of the human is the eye. A laser beam is coherent, monochromatic light with very high energy. A laser beam maintains its intensity even over large distances. If a laser beam hits a human eye, it will lead to irreparable damages, the retina will be destroyed. Therefore the following applies:
Never look directly into a laser beam, and do not place any objects in the beam, because even diffusely reflected beams will cause eye damage. **Never point the laser beam at a person's eyes.**

2. Danger of Skin Damages

If a laser beam hits the human skin it will cause painful burns due to its high energy density. The beam will also burn holes into textiles. Therefore **never put your hands in the laser beam and do not intercept the beam with any other part of your body.**

3. Dangers due to High Voltage

Laser systems use fatally high voltages. **When operating your laser system, always observe the warning notes on the laser and the instructions concerning laser safety in the manual of your laser.**
Make sure that no unauthorized persons have access to your laser system.

4. Danger of Fire and Water Damages

If a laser beam hits easily inflammable material, for instance paper, this may ignite and may suddenly cause a fire. Therefore you should always make sure there is no inflammable material in the path of the beam before switching the laser on.

Check the water cooling system of your laser regularly, following the instructions of the manual. Especially hoses and their connections should regularly be checked for leaks to prevent water damages.

You should make it a rule to take the following safety precautions when operating your lasersystem in front of an audience:

- Mark an area of approx. 3 to 4m around the laser system as off limits.
- Test the laser system before the audience enters the room.
- Set the laser to the lowest visible beam level (Class 1) while adjusting optical components - modulator (PCAOM), mirrors, beam splitter - within the system.
- Optical components and the output window of the projector (Accurate) must be cleaned only if the laser is switched off.
- Regularly check the settings on your laser before switching it on to make sure that no unauthorized person has changed anything.
- **Never leave the laser unattended while it is running.**

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